

Amendments to the Specification:

Please amend the 15 consecutive paragraphs beginning on page 6, at line 23 as shown below:

The light fixture 10 is equipped with a variable color filter and control system according to this invention, as will be explained with reference to Fig.s 2 through 6. The variable color filter includes a color filter tube 22, an aperture mask 24 and a motor drive 26 for turning the color filter tube 22 relative to the aperture mask 24. In the embodiment of Fig.s 2-6 the aperture mask 24 is an aperture tube ~~24~~, best seen in Fig. 7, in which is defined a longitudinal slot aperture 28. The slot aperture 28 may be defined by application of a black or opaque covering 25 to the inner or outer surface of ~~a tube~~ color filter tube 22 of clear material such as clear polycarbonate plastic, leaving an uncovered clear strip area as ~~the~~ slot aperture 28.

The aperture tube is somewhat shorter than the length of lamp tube 20 and is supported at its opposite ends between a pair of collars 30. The two collars are mounted on the lamp base 12 and define mutually facing annular slots 32, shown in Fig.s 4 and 6. The lamp tube 20 passes through ~~central~~ collar openings 34 in the collars 30 to reach end sockets 16. The color filter tube 22 makes a sliding fit inside collar openings 34 and is supported in the collars 30 for rotation about the lamp tube 20. The driven end of the color filter tube 22 is fitted with a drive ring 36 which turns on the existing metallic end cap 40 of the lamp tube 20. The drive ring 36 is axially captive between the stationary collar 30 and the end socket 16, as best seen in Fig.s 2 and 6.

The motor drive 26 includes a motor housing 38 attached to mounting block 42 which extends radially from collar 30. The motor housing 38 is also supported on mounting plate 44 which is integral with the lamp base 12. An electric motor 46 is mounted in motor housing 38 and turns a motor shaft with a drive pulley 48, as seen in Fig. 3. A drive belt 50 driven by the drive pulley on the motor wraps around and turns the drive ring 36, thereby also turning the color filter tube 22 in collars 30 relative to the aperture ~~tube~~ mask 24. A radial tab 52 projects from collar 30 into slot ~~48~~ 49 of the lamp base 12 to better hold the collar 30 against rotation.

As best seen in Fig. 8, the color filter tube 22 has four circumferentially adjacent filter strips extending longitudinally the length of ~~the~~ color filter tube 22 and each extending circumferentially about 90 degrees or one-quarter of the circumference of ~~the~~ color filter tube 22. The four color filter strips include a generally clear strip 54, a generally opaque strip 56, a first colored strip 58 and a second colored strip 60. The clear and opaque strips are diametrically opposed to each other on color filter tube 22, and the two colored strips ~~56, 58~~ 58, 60 are also diametrically opposed to each other. The colored strips ~~56, 58~~ 58, 60 are each interposed in a circumferential direction between the clear and the opaque strips, 54, 56 on diametrically opposite sides of ~~the~~ color filter tube 22. The width or circumferential extent of ~~the~~ slot aperture 28 on ~~the~~ lamp tube 20 is approximately 90 degrees of the tube circumference or somewhat less than 90 degrees.

In an initial operational condition of the lamp fixture 10 the color filter tube 22 is rotationally positioned with the clear strip 54 in registry or alignment with ~~the~~ slot aperture 28 (the clear position), so that the light emitted by lamp tube 20 is passed without significant change in color, to provide normal, white light which is associated with a daytime or waking condition of those in the aircraft cabin. At a time when the cabin interior is to be darkened in order to allow the occupants to fall asleep, the motor 46 is activated, turning the color filter tube 22 at a slow, generally imperceptible rate of rotation, to bring the opaque strip 56 into alignment with ~~the~~ slot aperture 28 (the dark position). In the dark position light from the lamp tube 20 is generally blocked, and little if any light is emitted by the lamp fixture 10. Between the light and the dark positions of the color tube, the first colored filter strip passes into and out of alignment with ~~the~~ slot aperture 28. As the clear strip begins to move out of alignment with slot aperture 28 and the first colored ~~filter 56~~ strip 58 gradually moves into alignment, the light transmitted by slot aperture 28 is increasingly transmitted through the colored strip ~~56~~ 58 so that a blend of white and colored light is emitted from lamp fixture 10. As the color tube continues to turn the clear strip moves entirely out of alignment with slot aperture 28 and all light emitted through the aperture is colored by filter strip ~~56~~ 58. As tube rotation continues, the first colored strip ~~56~~ 58 also begins to move out of alignment with ~~the~~ slot aperture 28 as the opaque strip 56 moves into alignment with the aperture. During this process, slot aperture 28 is increasingly blocked by opaque strip 56 while a diminishing amount of

colored light is emitted by the lamp fixture 10 until the dark position is reached and light emission is blocked altogether.

The color of the first colored strip or filter is chosen so as to simulate the tint of the sky after sunset as dark night falls. A presently preferred first color for this purpose is blue to simulate evening twilight. It is also preferred to make the first colored filter of increasing density so that initially a light blue color is presented to ~~the~~ slot aperture 28 growing to a deeper blue, eventually fading into darkness as the opaque strip blocks light from the lamp tube 20.

The light fixture 10 is typically left in the dark position during a sleep period of the occupants of the passenger cabin, which may last a number of hours. At the end of the sleep period, when the cabin occupants are to be wakened, The motor 46 is again activated for turning the color tube from the dark position to the clear position at a slow, imperceptible or barely perceptible rate. The opaque strip 56 slowly moves out of registry with slot aperture 28 admitting the second colored strip ~~58~~ 60 into alignment with the aperture, so that a gradually increasing amount of light is passed and colored by the second colored strip ~~58~~ as 60. ~~As~~ the color tube continues rotation towards the clear ~~position~~ position, the opaque strip moves entirely out of alignment and is replaced by full alignment of the second colored strip with slot aperture 28, so that an greater amount of light is emitted and all of it is colored by second colored strip ~~58~~ 60. This stage is succeeded by a condition where the second colored strip ~~58~~ 60 is itself gradually replaced by the clear strip 54, so that the coloring fades as a diminishing amount of light passes through second colored filter strip ~~58~~ 60 and more light passes through clear filter strip 54, until the clear position is reached and all light emitted through slot aperture 28 is clear and substantially uncolored.

The color of the second colored strip or filter is chosen so as to simulate the coloring of the sky during sunrise as the sky transitions from darkness to daylight. A presently preferred color for this purpose is yellow, which is suggestive of sunlight. It is preferred to also make the second colored filter of increasing density from the clear to the opaque strips, so that initially a deep yellow color is presented to ~~the~~ slot aperture 28 growing to a lighter yellow, the yellow coloring eventually fading into white as the clear strip passes the light from the lamp tube 20.

As an alternative or an adjunct to gradation of the color density of the color filter strips, electronic dimming of the fluorescent lamp tube may be employed to deepen the apparent color of the light in coordination with rotation of the color filter tube 22 to and from the dark position. That is, an increasingly deeper blue light coloring may be achieved by slowly dimming the intensity of the lamp tube 20 as the blue filter strip passes across the mask aperture towards the dark state of the lamp fixture. Conversely, an initially deep yellow coloring may be obtained by dimming the light output of lamp tube 20 as the opaque strip moves out of registry with ~~the~~ slot aperture 28 and the yellow filter strip moves into registry. The light output of ~~the~~ lamp tube 20 is then gradually increased in step with rotation of the color tube until full light output of the tube is achieved, for example, as the yellow filter has reached full registry with the mask aperture or the clear strip starts to move into partial registry with the light aperture. The use of electronic dimming as just described may render unnecessary the use of color gradient filter strips so that color filter strips of single density are effective for rendering the desired light coloring effects, particularly where a relatively wide mask aperture is employed which is less effective in its selectivity of a particular region of a color gradient on the filter strip.

Coordination of electronic dimming of lamp tube 20 with mechanical rotation of color filter tube 22 is conveniently achieved under program control of a microprocessor or microcontroller connected to the dim level input of a dimmable fluorescent lamp ballast on the one hand, and for driving the motor 46 of the lamp fixture 10 on the other hand. One such microprocessor or microcontroller can be connected for operating multiple lamp fixtures 10 in this manner, thereby to control the accent lighting of an aircraft cabin or a room furnished with a number of such lamp fixtures.

Fig. 11 is a block diagram of a typical electronic control system 80 for the accent light fixture 10. A serial control signal generated by a suitable controller is input to a control decoder 82. Decoder 82 receives position input of the color filter tube 22 from limit switch SW1 mounted at a convenient location on the lamp fixture for producing a switch signal to the decoder representative of a predetermined rotational position of the color tube. The control decoder delivers a ~~contro~~ control output to step motor driver 84 which actuates step motor 46 to turn the color tube at a rate and to an extent determined by the serial control

signal. The serial control signal is also an input to a ballast dim controller 86 which in turn controls a ballast lamp drive 88 so as to drive the lamp tube 20 to a desired level of light output.

Fig. 9 shows an alternative aperture defining mask in the form of an opaque layer ~~60~~ 61 applied to the outer surface of the lamp tube 20 so as to define a slot aperture 62 through which is exposed an unblocked strip area 64 of the lamp tube. The opaque layer may be an adhesive sheet material or a light blocking paint, for example, applied to the lamp tube. The alternative mask may also be a tubular ~~material such as a longitudinally slotted tube~~ material, such as a longitudinally slotted tube, that can be fitted onto the lamp tube, or a cylindrical tube of clear material fitted over the lamp tube and partially covered with light blocking material while leaving a longitudinal clear slot area. It will be appreciated from the foregoing that the aperture defining mask can be interposed between the lamp tube and the color tube so as to limit illumination of the color ~~wheel~~ tube to only a particular circumferential portion of the color tube, so that the light fixture 10 only emits light passed by the selected illuminated circumferential portion of the color tube, or the mask can be exterior to the color tube so as to contain light passed by circumferential portions of the color tube and pass only light filtered by a circumferential portion of the color tube selected by its alignment with the aperture.

Fig. 10 depicts an alternate, compound color tube 70 for use in the variable color filter for a linear fluorescent lamp according to this invention. The color tube 70 consists of two concentric primary color tubes 72, 74 each of which has three longitudinally extending and circumferentially adjacent red, blue, green color filter strips 72a, 72b, 72c and 74a, 74b, 74c respectively. Each primary color tube 72, 74 is turned independently of the other color tube by a drive motor relative to a mask aperture dimensioned and positioned in the manner described with regard to the embodiment of Figs 2-6. Two drive motors can be provided in a lamp fixture such as shown in Fig. 1, one drive motor at each end of the lamp tube, each motor installed as shown in Figs 3 and 4 but one motor turning the outer primary color tube 72 and the other motor turning the inner primary color tube 74 by means of corresponding drive rings which may be similar to drive ring 36. For any arbitrary position of the primary color tubes 72, 74, one color filter or a combination of two adjacent filters on each tube 72,

74 is in alignment with a mask aperture of the color control system of the lamp fixture. These aligned color filters also overlap each other with cumulative filtering action such that the color of light from the lamp tube ultimately passed by both filters is a combination of the overlapping filter colors. By appropriate selection of the aligned color filters on the concentric tubes a large range of light color outputs can be obtained. The range of colors can be further increased by making each of the color filter strips 72a,b,c and 74a,b,c of graduated density so that the relative intensities of the filter colors being combined may be selected by suitable rotational positioning of tubes 72, 74 relative to the mask aperture of the fixture.

In an alternate form of the invention, mechanical dimming of the linear fluorescent light tube 20 is achieved by dispensing with the color filter strips 58, 60 of the color filter tube 22 thereby to provide a dimming tube which is clear about its circumference except for an opaque longitudinal strip of sufficient circumferential dimension to substantially block emission of light when the opaque strip is brought into registry with ~~the mask slot~~ aperture 28, 62. The dimming tube is similar to color filter tube 22 in Fig. 8 except that the color strips 58, 60 are replaced by clear strips, or a single clear area can be provided in place of the three strips ~~54, 56, 60~~ 54, 58, 60, leaving only opaque strip 56 on an ~~otherwise~~ otherwise clear tube. Initial positioning of the dimming tube, so as to align only the clear portion with the mask aperture, allows substantially unimpeded passage of light emitted by the lamp tube 20 resulting in full intensity illumination by the light fixture 10. Rotation of the dimming tube gradually and increasingly brings the opaque strip into partial registry with the mask aperture, thereby blocking light emission to an increasing extent. When the opaque strip is brought into full registry with the mask aperture, light emission is substantially fully blocked and the lamp fixture is in a dark state even though the lamp tube 20 is turned on. Between the full illumination and dark states of the lamp fixture, precise control of light intensity is readily achieved by rotational positioning of the dimming tube relative to the mask aperture 28, 62. The overlapping mask aperture and movable opaque strip in effect define a continuously variable light aperture which is adjustable to pass a desired degree of illumination from lamp tube 20.

Such mechanical dimming provides an alternative to electronic dimming of fluorescent light tubes which in some cases is difficult to achieve. Some fluorescent lamps have

a tendency to flicker when electronically dimmed. It is also difficult to achieve low level dimming of fluorescent lamps because of noticeable flicker or a tendency to extinguish at low levels. Furthermore, the mechanical dimming approach just described allows precise, continuous control over light intensity from full intensity through very low levels of illumination to full darkness simply by rotational adjustment of the dimming tube so as to increase or decrease the effective aperture defined by the combination of the mask aperture and the opaque strip of the dimming tube. It should be appreciated that the geometry of the opaque and clear areas of the dimming tube need not be in the form of rectilinear strips but may take any form such as to define a variable light aperture by rotation of the dimming tube relative to the mask aperture.